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WATER TRANSFERS PAPERS FOR WATER TRANSFERS IN 2002 INVOLVING THE DEPARTMENT OF WATER RESOURCES

- Information to Parties Interested In Making Water Available to the Environmental Water Account or the State's 2002 Dry Year Water Purchase Program

- Groundwater Substitution Transfers -- How to Make Them Work in the Sacramento Valley in 2002

- Water Transfers Based on Crop Shifting and Crop Idling – How to Make Them Work in the Sacramento Valley in 2002

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Prepared By:
WATER TRANSFERS OFFICE
CALIFORNIA DEPARTMENT OF WATER RESOURCES

FORWARD

These three water transfers papers compiled here were originally written as papers that could be reviewed separately. They have been compiled into one set of papers to help interested parties to review them as a group. These documents are currently in draft to allow more extensive review by parties who did not have an opportunity to assist in their development. Comments should be provided to the Water Transfers Office at the address below.

I wish to thank all those who assisted in the development of these papers. Your insight, knowledge and time devoted to this effort are greatly appreciated. Our goal in the development of these papers has been to resolve issues where possible, and make more clear the technical aspects of water transfers that need to be considered when contracting with the Department of Water Resources to either purchase or convey water made available through responsible water transfers. The purpose of these papers is to facilitate and expedite this contracting process by making the technical aspects of water transfers readily available to interested parties. These papers are not intended to have regulatory effect.

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Information to Parties Interested in Making Water Available to the Environmental Water Account or the State's 2002 Dry Year Water Purchase Program

I. Introduction

The Department of Water Resources (DWR) encourages locally developed water transfers as a way to help meet local water supply needs as well as those of the State and the environment. The purpose of this and related papers is to provide technical guidance to local parties who wish to sell water to the State's 2002 Dry Year Water Purchase Program and the Environmental Water Account (EWA)[1] through water transfers[2]. The focus of these papers is water transfers from areas in the greater Sacramento Valley to areas south and west of the Sacramento-San Joaquin Delta. The detailed aspects of these papers should not be considered to provide technical guidance for other water-source areas. Also, these papers provide parties wishing to conduct similar water transfers not related to these programs with insight into DWR's technical perspective relative to out-of-basin water transfers.

II. Water Transfer Principles

- Local Leadership – DWR recognizes the importance of local leadership in making decisions on how to better manage the State's water resources. Accordingly, DWR will work cooperatively with local water associations, their member agencies, local government and other leaders in the Sacramento Valley and other regions to assure that local interests have the opportunity to manage their resources in a manner that meets local objectives.

[1] The Environmental Water Account (EWA) is a State and federal program established in the August 2000 CALFED Record of Decision to allow additional environmental protection actions with no uncompensated water or power costs to the water users. The water supply costs of the program are made up in part through water transfers.

[2] The Department of Water Resources (DWR) is coordinating the water purchase aspects of these two programs with the assistance of the U.S. Bureau of Reclamation (USBR) and other State and federal agencies. These papers are presented to facilitate and expedite the contracting process for responsible water transfers and are not intended to have regulatory effect.

- Assuring Adequate Local Supplies - Before suppliers are asked to make supplies available for others, there needs to be assurance that such transfers will not adversely affect other water users of the same resources. DWR will work with local water agencies and associations and other local interests in the Sacramento Valley and other regions to assure that supplies are reasonably available to meet local needs in those regions.

- Locally Developed Programs - Strategies for making water supplies available need to be locally driven and developed in cooperation with local public leaders. DWR will respect the right of individual local water entities to determine the best way in which local water purveyors can make water available for local, regional, and Statewide use. Such local programs should be in compliance with all applicable laws, including local ordinances. California law recognizes transfers as a beneficial use of water and protects the underlying water rights involved in a transfer.

- Third Party Impacts - Water transfers should be designed to avoid injury to other legal users of water and unreasonable effects on the overall economy in the counties from which the water proposed for transfer originates. Water transfer programs need to establish effective mechanisms to ensure that injury to other legal water users is identified and mitigated. In addition, evaluation of possible economic effects of the transfer at the countywide level is needed to identify possible actions to prevent unreasonable economic effects. Administration of these mechanisms should be at the local level and under local control.

- Environmental Protection - Actions to develop additional supplies for water users need to be implemented in a manner that is compatible with ongoing environmental protection and restoration programs. Examples of such programs include the CALFED Environmental Water Account, Ecosystem Restoration Program, and Central Valley Project Improvement Act implementation efforts as well as any local actions to protect environmental resources.

- Statewide Perspective - In fulfilling its obligations, DWR recognizes that it must represent the interests of all parts of the State, both those areas needing additional supplies and those that can make supplies available.

III. Water Customer Issues for DWR

- When DWR is purchasing water through water transfers for either the Dry Year Program or EWA it is a customer looking for a commodity that meets it needs. Like any customer, DWR has a sense of the characteristics of the commodity in which it is interested to purchase. Also, the Legislature has given DWR a set of legal principles that need to be satisfied if DWR is to be involved in the purchase or conveyance of water. These legal principles are discussed later and require DWR to be concerned about the impacts of its water purchases on the water source areas. DWR attempts to address these impacts as it works with parties to either purchase water or enter into agreements to use DWR facilities. This concern about possible local area impacts of water transfer makes DWR an "enlightened consumer" as it enters the water market. This is not much different than outlining the characteristics of an automobile that meets the needs of your family or the quality of the produce you are willing to purchase. Many consumers want these products to be produced in a manner that is as environmentally friendly as possible. DWR has a similar desire with regard to water transfers. This set of water transfer papers is intended to give parties interested in doing water business with DWR, an idea of the characteristics of the water commodity in which it is interested to purchase or convey through its facilities.

IV. Types of Water Transfers of Greatest Interest to DWR

- Stored Water – Release of stored water that would remain in storage or would be stored in the absence of the water transfer.

- Groundwater Substitution – Reduction in surface water use which is offset with additional groundwater pumping. (See paper titled

"Groundwater Substitution Water Transfers – How to Make Them Work in the Sacramento Valley in 2002.")

- Crop Idling/Crop Shifting – Reduction in surface water use resulting from a reduction in the evapotransporation of applied water to agricultural crops that would have occurred in the absence of the water transfer. (See paper titled "Crop Shifting/Crop Idling Water Transfers – How to Make Them Work in the Sacramento Valley in 2002.")

V. Types of Water Transfers of Little or No Interest to DWR

- Direct Pumping of Groundwater – Water Code Section 1220 establishes significant barriers to the export of groundwater outside the Sacramento Valley. DWR is not interested in facilitating the direct transfer of groundwater from one area to another.

- Transfers that Injure Legal Users of Water or Cause Unreasonable Effects to the Environment – Water transfers that simply reclassify existing stream flows from one category to another, making these flows no longer available to historic downstream users, have the potential to injure other legal users of water and cause harm to the environment. Water transfers should focus on either making new surface flows available or reducing surface water use in such a way as to expand the availability of surface water resources for use by others.

VI. Legal Principles to be Addressed as Part of the Water Transfer Proposal

- Three Principles Related to Water Transfers – California law contains numerous protections[3] that apply to water transfers. However, there are three fundamental principles that typically apply: (1) no injury to other legal users of water, (2) no unreasonable effects to fish, wildlife or other instream beneficial

[3] California Water Code Section 1810 *et seq*. specifies the requirements that must be met in order for DWR and other regional and local agencies to allow use of their conveyance facilities. Also, Water Code Sections 386, 1702, 1706, 1727 and 1736 follow the common law and establish similar requirements for changes in water rights.

uses of water, and (3) no unreasonable effects on the overall economy or the environment in the counties from which the water is transferred[4]. DWR will not support or participate in any water transfer where these basic principles have not been adequately addressed.

- Suggested Methods to Develop Workable Water Transfers – The outline below provides some technical suggestions to assist parties in addressing these principles to develop successful water transfers.

    - No Injury to Legal Users Of Water

        - Determine the water available for transfer based on the conditions that would exist absent the water transfer or the program that makes the transfer water available.

        - Include real-time monitoring programs as a part of the water transfer to trigger corrective actions that help avoid possible impacts as they may develop. This is especially important for groundwater substitution transfers.

        - Include a mitigation program that specifies the actions that will be taken as quickly as may be necessary to prevent injury from occurring.

        - Include reservoir "refill criteria" for storage water transfers as appropriate to protect downstream users from delayed impacts of the water transfer. Refill criteria are developed on a site-specific basis and may be different for water transfers with places of use within, as opposed to those outside, the Sacramento Valley.

    - No Unreasonable Effects on Fish and Wildlife

[4] Strictly speaking, economic issues are typically only required to be evaluated in water transfers that seek to utilize DWR's water conveyance facilities or those of other State or local agencies. However, economic impacts that are associated with physical changes to the environment may require analysis under the California Environmental Quality Act (CEQA).

- Coordinate with State and federal fishery agencies to help make water available in the most "fish friendly" method possible, to help avoid adverse effects on fish and wildlife due to the water transfer, and when possible to enhance fishery habitat.

- Disperse any cropping land use changes and avoid actions that affect critical habitat of sensitive fish and wildlife species.

- Include monitoring programs as may be needed to implement adaptive management efforts to mitigate potential impacts on fish and wildlife.

- Adhere to established operational limits in existing permits and licenses.

- No Unreasonable Effects on the Overall Economy in the Counties from which the Water is Transferred[5]

  - Limit the scope and extent of actions that can affect the local economy.

  - Recognize that investment of local income from water transfers typically goes back into normal business operations and improvements of local water supply systems.

  - Work with the transferring water district, and, as necessary, county government representatives to help identify actions that may become necessary if the cumulative economic effects of water transfers in those counties appear to DWR to reach unreasonable levels.

[5] If public wheeling facilities are not utilized, Water Code Section 1810, e*t seq*. does not apply, but this issue should still be addressed at the local level. Also, see footnotes 3 and 4.

VII. Developing a Water Transfer Proposal

- Parties are encouraged to work with local water agencies and districts to develop joint water transfer proposals capable of providing substantial quantities of water.

- Parties may wish to seek the advice of an attorney and a professional engineer in developing the water transfer proposal.

- The amount of water made available for transfer by the seller is determined at the most downstream point of control of the seller. Losses beyond this point are not a concern to the seller and will be determined for possible buyers by DWR in cooperation with USBR.

VIII. Price

- The price to the seller will be negotiated on a per acre-foot or per acre basis. The price will be based in part on the costs of making the water available and the prospective buyer's willingness to pay.

- Options may be available depending on the mutual interests of the buyers and the sellers. The price of the option paid to the seller will be negotiated and is typically small, paid early and non-refundable except in limited circumstances. The total price of the water if "called" will include the option price as a down payment. "Call dates" for options are negotiable but should balance the needs of prospective buyers and the sellers.

IX. Environmental Documentation

- Parties are encouraged to complete their own environmental documentation of the water transfer proposal in compliance with the California Environmental Quality Act (CEQA). The document needs to cover issues in a manner that allows DWR to use this document as a "Responsible Agency" under CEQA. CEQA exemptions should be evaluated and used when appropriate. Parties are encouraged to develop these documents in consultation with DWR.

- Parties that do not prepare their own CEQA documentation need to provide adequate information to enable DWR to complete CEQA compliance.

- Proposals reliant upon the use of federal facilities and approvals by USBR may require completion of National Environmental Policy Act (NEPA) documentation prior to approval by the United States.

X. Water Right Changes

- Depending on the location of the possible buyers, temporary changes in water right permits may be needed for some water transfers. Parties are encouraged to contact DWR for assistance in determining the types and scope of water right actions that may be needed. Individual water right holders are responsible for obtaining changes to water rights from the State Water Resources Control Board (SWRCB) as needed. For those parties entering into contracts as part of the State's Dry Year Program or EWA, DWR and USBR are willing to use the flexibility under their water rights to accommodate the water transfer. This accommodation will be consistent with the water right permits of DWR and USBR, their water supply contracts and State and federal law and policies.

XI. Protection of Water Rights

- DWR wants to ensure that the water rights of parties to the transfer are not adversely affected if they decide to enter into a water transfer agreement. California law protects the underlying surface water rights of parties who wish to transfer a portion of their surface water supply to others. In some cases certain reports to regulatory agencies are needed to ensure protection of these rights. DWR's water purchase agreements expressly recognize the legal protections afforded the seller's underlying water rights in a water transfer. Additional information about water rights protection and water transfers is available in a SWRCB staff document titled "A Guide to Water Transfers" available from the SWRCB at their

water rights web site at www.waterrights.ca.gov under water transfer information.

XII. Water Transfer Proposals

- Parties interested in making water available to EWA or the State's Dry Year Water Purchase Program are encouraged to develop a proposal using the information set forth in this paper and the companion documents. Proposals, contract negotiations and CEQA documentation need to be completed in the January through March timeframe to allow implementation by April wherever possible. Parties interested in developing water transfers are also encouraged to contact one of the individuals identified below for assistance as needed.

XIII. Contacts

- Teresa Geimer – State Water Project Analysis Office - DWR
  (916) 653-4547

- Jerry Johns – Water Transfers Office - DWR
  (916) 651-7054

Groundwater Substitution Transfers

How to Make Them Work in the Sacramento Valley in 2002

I. Introduction

The purpose of this and related papers is to provide technical guidance to local parties who wish to sell water to the State's 2002 Dry Year Water Purchase Program or the Environmental Water Account (EWA) [6] through water transfers. The focus of these papers is water transfers from areas in the greater Sacramento Valley to areas south and west of the Sacramento-San Joaquin River Delta. These papers should not be considered to provide technical guidance for other water source areas. The information in this paper is intended to assist parties in developing the data and materials needed to support agreements for water transfer purchases and water conveyance with the Department of Water Resources (DWR) [7].

This paper was assembled by the Water Transfer Office of DWR. Contributions to this paper were made by technical experts from within DWR and U.S. Bureau of Reclamation (USBR) and interested parties in the Sacramento Valley. DWR appreciates the assistance of all the individuals who helped produce and review this paper. Those who helped may not agree with all aspects of this paper. However, most agreed that its development would be helpful as DWR begins water supply purchase discussions for the State's 2002 Dry Year Water Purchase Program and EWA.

For an overview of water transfers for 2002, parties are encouraged to read a companion paper, "Information to Parties Interested in Making Water Available to the Environmental Water Account (EWA) or

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[6] The Environmental Water Account (EWA) is a State and federal program established in the August 2000 CALFED Record of Decision to allow additional environmental protection actions with no uncompensated water or power costs to the water users. The water supply costs of the program are made up in part through water transfers.

[7] These papers are presented to help facilitate and expedite the contracting process with DWR for responsible water transfers and are not intended to have regulatory effect.

State's 2002 Dry Year Water Purchase Program." This paper is available by contacting the Water Transfers Office at (916) 651-7054.

DWR supports water transfers as a way to help meet local water supply needs as well as those of the State and its environment. The purpose of this document is to provide guidance to local parties who seek DWR assistance for a water transfer involving the substitution of groundwater in lieu of surface water diversions in the Sacramento Valley. Groundwater substitution transfers are the additional pumping of groundwater with a one-for-one reduction in surface water diversions that would have occurred absent the additional groundwater pumping. The amount of reduced surface water diversions is then transferred to other water users.

California law protects the surface water rights of water users who engage in groundwater substitution transfers. Also, overlying users of groundwater, including those with access to surface water, do not lose the right to use their underlying groundwater supplies for reasonable and beneficial use simply because they have access to surface water.

California law protects other existing water users, the environment and (in many cases) the source area economy when water is transferred[8]. Groundwater substitution transfers have the potential to cause injury to other local groundwater users due to the additional groundwater pumping needed to allow the surface water transfer to take place. Injury can also occur to downstream water users due to interaction between the surface and subsurface components of the water system if all or a portion of the additional pumped groundwater reduces stream flows at a time when it is used by downstream users.

The rationale behind a groundwater substitution transfer is that surface water demands are reduced because a like amount of water from an alternative source, in this case groundwater, is used to meet

[8] California Water Code Section 1810 *et seq.,* specifies the requirements that must be met in order for DWR and other regional and local agencies to allow use of their conveyance facilities. Also, Water Code Sections 386, 1702, 1706, 1727 and 1736 follow the common law and establish similar requirements for changes in water rights. Strictly speaking, economic issues are typically only required to be evaluated in water transfers that seek to utilize DWR's water conveyance facilities or those of other State or local agencies. However, economic impacts that are associated with physical changes to the environment may require analysis under the California Environmental Quality Act (CEQA).

these demands. The unused surface water is then transferred to other users. Typically, the amount of water credit given such a transfer is the amount of the increased pumping that takes place to support the transfer. This credit assumes there is no interaction between the surface water and the groundwater that is affected by the additional pumping for the transfer. If there is interaction, then the extraction of groundwater is not truly an alternative source to the surface water supply and the net surface water flows will not increase as assumed.

This paper provides technical guidance to assist parties in developing the information necessary to support the assumption that the additional groundwater pumping for a groundwater substitution transfer does not affect the surface water system. This discussion is not a statement relative to the legal definition of groundwater for regulatory purposes, nor should it be used for that purpose. Currently, the regulatory distinction between surface water and percolating groundwater for water right permitting purposes does not rest on the connection between the two. Instead it is based on the establishment of the existence of "bed and banks." DWR does not wish to upset existing law as to the regulatory distinction between surface water and percolating groundwater. DWR's concern is that sufficient information be developed as part of the groundwater substitution proposal to support the assumption that surface water demands are in fact reduced by the like amount of additional groundwater pumping to support the transfer of the surface water.

Significant accretions and depletions in surface water flow due to groundwater flow occur along the Sacramento River. Normal groundwater pumping likely affects these flows and such effects are allowable under current California water law. However, if a party wishes to transfer surface water by virtue of the use of an alternative water supply, that party needs to establish that the supply is truly an alternative one to the surface water system during times of importance to downstream water users.

The technical guidance in this paper is presented by DWR to assist parties in avoiding injury to other legal users of water and harm to the environment in the development of groundwater substitution transfers.

II. Overview of Groundwater Substitution Transfers

A groundwater substitution transfer program is made up of several components: (1) the placement and characteristics of the wells that will be pumped, (2) the groundwater pumping program in terms of volume, schedule of the additional groundwater pumping, and the method of documenting and reporting the additional groundwater pumping, (3) the monitoring program to assess in real-time the effects of the groundwater substitution program on local groundwater users and surface water diverters, and (4) a mitigation program to be used to alleviate possible injury issues.

Parties are encouraged to provide to DWR staff early in the year (and substantially in advance of the dates noted in Section III.D), a description of the wells they may use in a groundwater substitution program. The description of the wells can be provided before the other details of the program are available. The wells will be evaluated using the factors presented in this paper. Approval of the wells by DWR early in the process will help expedite implementation of the overall program. DWR will coordinate this review with USBR.

The actual pumping program in terms of volume and schedule together with reporting, monitoring and mitigation elements of the program should be provided to DWR for review as soon as they are available. DWR will also coordinate the review of this information with USBR. Modifications to these programs may be recommended by DWR to help ensure injury does not occur through the implementation of the groundwater substitution program. The details of the groundwater substitution transfer program will be made part of the water purchase agreement with DWR.

If DWR is requested by a third party to move the water made available through groundwater substitution through DWR facilities, the concurrence of the program will be made part of the water conveyance agreement with DWR. DWR will assist in facilitating groundwater substitution transfer programs that meet the technical guidance outlined in this paper.

III. Evaluations of Wells and Well Placement

A. Need for the Evaluation of Wells

The groundwater and surface water systems in many areas of the Sacramento Valley are closely connected. The additional pumping for groundwater substitution transfers may reduce surface flows at some time in the future. A reduction of surface flows in a river, stream, canal, or drain that is tributary to the Sacramento-San Joaquin Delta (Delta) by a groundwater substitution transfer could injure DWR and USBR in their operation of the State Water Project (SWP) and Central Valley Project (CVP) respectively. The placement and construction of the wells to be used in a groundwater substitution transfer are a major factor affecting the potential of the water transfer to directly affect stream flows. All parties seeking the cooperation of DWR in a groundwater substitution transfer need to have the wells reviewed and approved by DWR for use in a groundwater substitution transfer prior to the initiation of the transfer. DWR will coordinate this review with USBR. This well use approval process is intended to reduce the likelihood of the groundwater substitution from directly affecting stream flows.

B. Status of Previously Accepted Wells

Wells approved for use in transfers in the early and mid-1990's will not be automatically approved based upon prior approval. Those previously approved wells were evaluated for drought emergencies or immediate water needs and required accelerated and limited reviews. Data were often incomplete and well locations were approximated. In addition, technical evaluation criteria for well placement and construction were not formulated until 1995. Therefore, those "previously approved wells" will have to undergo renewed data submittals and evaluations under the factors set forth in this document. This submittal of data for well approval also applies to many wells approved for the 2001 Forbearance Agreement due to the development of Figure 1, "Groundwater Substitution Water Transfers – Well Approval Areas." This figure adds significant new surface water features to those typically used in the past.

The proximity of existing wells to these surface water features affects the criteria used to evaluate the well's acceptability for inclusion in the groundwater substitution program.

Parties wishing to use wells that were used in previous transfers facilitated by DWR who do not have well logs or other information to support their continued use need to contact DWR at the earliest possible date. Additional monitoring to evaluate the effects of these wells on the surface water system may be substituted on a provisional basis to determine the acceptability of the continued use of these wells in the future.

This acceptability may reflect the degree to which water from these wells is affecting stream flows. If the data shows that some fraction of the water from these wells (for example, 30 percent) affects surface water flows, then credit for the water pumped could be adjusted to reflect this contribution (for example, credit for 7 of every 10 units of water pumped).

Wells approved under the technical guidance outlined in this paper will be acceptable under future transfers without any additional review unless local groundwater conditions degrade or threaten to degrade (e.g., the cause of overdraft, reduce water quality, or cause subsidence), or new geohydrologic studies change the understanding of the connection to the surface water system tributary to the Delta. If groundwater conditions have degraded, the use of the wells for future transfers will be reevaluated in light of the changes.

C. Wells Will be Evaluated Based Upon the Following Information:

1. The well's location relative to the surface features shown on the Figure 1. This figure is available in an Arcview georeferenced format to allow the expansion to any

appropriate scale. To obtain the Arcview formatted copy of this map, contact Robert Niblack at Central District DWR at (916) 227-7540.

2. The well's surface annular seal, gravel pack interval and casing perforation depths.

3. The general permeability of geologic materials described on the well log.

4. Other information provided by the transferor, (e.g., well draw down tests, water quality and/or site-specific studies) that documents the well is not in hydrologic connection with surface waters tributary to the Delta.

5. Other information available to DWR or USBR. Parties proposing groundwater substitution transfers are encouraged to have proposed wells reviewed and pre-approved far in advance of the commencement of the proposed transfer. The wells could be reviewed while the overall groundwater substitution transfer is still being developed. This pre-approval of wells would help expedite the overall approval process.

D. Specific Information Needs Used to Evaluate Each Well

1. All wells involved in the groundwater substitution transfer, or proposed for use in future transfers, need to be identified (the name of the water district, name of the owner and the owner's well identification number) in a letter to DWR sent at least one month before the transfer is to begin.

2. A map showing the location of all wells that will be involved in the transfer needs to be submitted at least three weeks before the transfer is to begin. DWR or USBR may field verify the location of wells and their setup for use in the transfer (e.g., is groundwater to be applied to surrounding land, or is groundwater to be pumped into district canals, etc.).

3. Wells will be evaluated in part based on their proximity to major and minor surface water features tributary to the Delta potentially affected by groundwater pumping. Wells located further than two miles from major surface water features and further than one mile from minor surface water features will be automatically accepted without any additional information other than a map verifying the location of the well. However, the transferor should be aware of these wells' construction information when formulating the monitoring and mitigation programs.

4. Data for all wells involved in the groundwater substitution transfer located within two miles of a major surface water feature and within one mile of a minor surface water feature need to be provided within three weeks before the transfer begins. Well specific data acceptable to DWR consisting of the following need to be submitted:

    (a) A copy of a 7.5 minute quad sheet map showing the location of the well and the locations of nearby rivers, streams, canals or drains.

    (b) A driller's log giving the geology and well construction (well seals and well perforated intervals) or a letter from the drilling company giving this information. A geophysical log can be used in place of the geology on the driller's log. If the driller's log and the well construction are not matched (e.g., perforations opposite clay zones), additional information may be required.

    (c) In the absence of the data in item (b), any other information (groundwater quality, pumping tests, localized studies) that will

show the well is not hydrologically connected to a nearby river, stream, canal or drain.

5. Wells located near **major** surface water features[9] tributary to the Delta potentially affected by groundwater pumping shown in Figure 1 will be evaluated by using the following procedure:

   (a) Wells located between one and two miles of a major surface water feature tributary to the Delta will be accepted unless one of the following applies:

      (1) No driller's log or other sufficient information is submitted to demonstrate that the well is not connected to the surface water system tributary to the Delta, or

      (2) The well is perforated above 50 feet and insufficient information is submitted to demonstrate that the well is not connected to the surface water system tributary to the Delta.

   (b) Wells located within one mile or less from a major surface water feature tributary to the Delta will be accepted if the following conditions are met:

      (1) The uppermost perforations start below 150 feet, or:

      (2) The uppermost perforations start between 100 and 150 feet and:
      There is a surface annular seal to at least 20 feet; and
      There is a total of at least 50-percent

[9] Major surface water features tributary to the Delta affected by groundwater pumping are: Sacramento River, Feather River, Big Chico Creek, Cottonwood Creek, Stony Creek, Yuba River, including the Yuba Gold Fields, American River and the Cosumnes River.

fine-grained materials in the interval above 100 feet; and

There is at least one fine-grained layer that exceeds 40 feet in thickness in the interval above 100 feet; or

(3) Other information is provided to DWR and USBR that demonstrates that the well is not in connection with the surface water system tributary to the Delta.

6. Wells located near **minor** surface water features[10] tributary to the Delta potentially affected by groundwater pumping will be evaluated by using the following procedure:

(a) Wells located between one half and one mile of minor surface water features tributary to the Delta will be accepted using the same criteria listed for 5(a) above.

(b) Wells located within one-half mile or less from a minor surface water feature tributary to the Delta will be approved using the using the same criteria listed for 5(b) above.

7. Groundwater substitution transfers involving wells in the following areas will also be evaluated to determine each well's possible negative impact upon the local groundwater regime:

(a) Wells in areas of long-term groundwater overdraft (as evidenced by long-term groundwater level declines),

(b) Wells in areas of past ground subsidence or,

[10] Minor surface water features tributary to the Delta potentially affected by groundwater pumping and shown on Figure 1 are: Colusa Basin Drain, Tule/Toe Canal, and Natomas Cross Canal.

(c) Wells in areas adjacent to poor groundwater quality.

IV. Evaluation of the Groundwater Substitution Program

Once the wells have been reviewed and approved by DWR and USBR, the overall groundwater substitution transfer program needs to be developed by the water transfers proponent and provided to DWR. The program includes: (1) the wells that will be pumped, (2) the schedule and volume of water to be pumped, (3) the baseline from which the additional pumping will be measured, (4) the method of measuring and reporting the volume of water pumped, (5) a monitoring program and (6) a mitigation program. The details of the groundwater substitution program will be among the contractual commitments in the water purchase or water conveyance agreement with DWR.

Compliance with local requirements (including ordinances relating to well drilling and groundwater extraction) and local groundwater management plans, as well as compliance with adjudications and with the overdraft protections in Water Code Section 1745 *et seq*.,[11] will be the responsibility of the entity proposing the groundwater substitution transfer.

V. Monitoring Program

A good monitoring program is an essential component of a successful groundwater substitution transfer program. Such a monitoring effort will document whether the additional pumping due to the groundwater substitution transfer is affecting adjacent wells or downstream users and the magnitude of this effect. Monitoring also provides those conducting the groundwater substitution program information to

[11] California Water Code Section 1745.10 requires groundwater substitution transfers to be either (1) consistent with a groundwater management plan adopted pursuant to state law for the affected area or (2) approved by the water supplier from whose service area the water is to be transferred and that water supplier, if a groundwater management plan has not been adopted, determines that the transfer will not create, or contribute to, conditions of long-term overdraft in the affected groundwater basin.

address fears and claims of alleged injury. More importantly, the monitoring program provides information to allow quick action to address and mitigate legitimate claims of injury before they become severe.

The costs of the monitoring and mitigation programs need to be included in the overall operations and maintenance costs of a groundwater substitution program. An appropriate share of the operation and maintenance costs of the program are expected to be passed on to those purchasing the water supply.

The groundwater substitution transfer proponents need to prepare a Monitoring Program and provide it to DWR at least six weeks prior to project pumping. The Monitoring Program needs to incorporate the use of a selected number of groundwater wells used for pumping and other wells as appropriate. These wells, collectively called Monitoring Program Wells, will be monitored for water levels, water quality, and well discharge rates and volumes. The number of Monitoring Program Wells in the Monitoring Program will be based on their ability to accurately represent groundwater levels and response in the region before, during, and after transfer pumping takes place. Locations of proposed Monitoring Program Wells to be included in the proposed Monitoring Program will be plotted on USGS 7.5-minute quadrangle maps and will be listed in a table showing well owner, well name or owner's number, State Well Number, and latitude and longitude (handheld GPS).

A. Monitoring Wells

Monitoring Program Wells need to be configured with a permanent instantaneous and totalizing flow meter, access for measuring water levels, and be free of lubricating oil in the well casing or water level sounding tube.

B. Purpose of the Monitoring Program

The Monitoring Program needs to describe how the monitoring data will be collected reported and evaluated in order to:

1. Quantify and verify the groundwater portion of the transfer agreement.

2. Determine direct and residual effects of transfer pumping on the groundwater basins.

3. Assess the occurrence of any third party impacts and, if they occur, their magnitude and significance.

4. Determine the surface water/groundwater interactions in the areas where groundwater is pumped for the transfer agreement, including both pumping-induced infiltration and interception of groundwater discharge, or identify a program that addresses this issue[12].

C. Scope and Monitoring Program Coordination with Other Efforts.

The network of monitored wells needs to be sufficient to allow the evaluation of the local, regional and downstream effects of groundwater substitution transfers. The network will allow this evaluation for both areas within and areas adjacent to the well field, and allow differentiation of effects from other local and regional groundwater conditions. Similarly, the network needs to be such that potential third-party impacts can be identified and differentiated from seasonal or other water level changes in the basin.

Groundwater substitution transfer proponents are encouraged to investigate ongoing monitoring that is being conducted in their area by DWR (or other agencies), and to integrate their proposed monitoring network into these ongoing monitoring efforts. Cooperative and integrated groundwater monitoring efforts benefit the groundwater substitution proponents by:

[12] The monitoring program needs to provide information on the interaction of the groundwater and surface water system. Parties are encouraged to pool resources and seek additional resources to conduct a more comprehensive evaluation of these interactions due to water transfers. Such a program is contemplated as part of the Sacramento Valley Water Management Agreement discussions. If such a program is developed, it may be used by parties to address these issues provided the specific water transfer proposal is incorporated in the study and the water transfer proponent participates in the study.

(1) helping to reduce overall costs, (2) helping to obtain access to wells and information that may be difficult to do on their own, and (3) taking advantage of DWR District Staff's knowledge and expertise in turning groundwater data into unbiased information to assist in decision making.

D. Monitoring Program Contact

The proposed Monitoring Program should identify a contact person who will conduct the monitoring and assemble the data for submission to DWR. The contact person will meet with DWR's representative at least two weeks before the start of the groundwater pumping. Together, these parties may visit the Monitoring Program Well sites prior to the start of pumping to measure pre-pumping groundwater levels and read and inspect flow meters. DWR will coordinate this review with USBR staff.

E. Monitoring Program Elements

The minimum Monitoring Program elements need to include the following activities:

1. Instantaneous and total flow, monthly and at the end of transfer pumping from <u>every</u> well pumped for the groundwater substitution program.

2. Measurement of water levels in Monitoring Program Wells:

   (a) Not more than two weeks prior to the start of transfer pumping.

   (b) Every second day during the first 14 days of transfer pumping.

   (c) Weekly during the third through the last week of transfer pumping.

(d) Every other week after pumping stops and until water levels recover to pre-pumping conditions or water levels stabilize.

3. Field measurement of electrical conductivity in all Monitoring Program Wells during every water level monitoring visit while the well is pumping.

F. Evaluation and Reporting

The proposed monitoring program needs to describe the method of reporting which, at a minimum, will include providing of data summary tables to DWR (and as appropriate USBR) each month during pumping under the program until the groundwater levels return to those prior to the start of the pumping. The program needs to also include a summary report on the quantity pumped, the impact on groundwater and surface water during and after pumping, and the extent and significance, if any, of impacts to local groundwater users.

VI. Mitigation Program

The effects of the additional groundwater pumping for a groundwater substitution transfer on adjacent groundwater users are difficult to know with certainty in advance. The monitoring program will identify areas that may become affected by the additional pumping. An effective mitigation program is needed to verify and correct problems that arise due to this additional pumping related to the groundwater substitution transfer. If these possible effects go uncorrected, the transfer of the surface water together with the additional groundwater pumping to support the transfer could cause injury to legal users of the groundwater and harm the environment. DWR will not participate in a water transfer that does not include an adequate mitigation program as part of the overall groundwater substitution program. Therefore, the local party conducting the groundwater substitution transfer needs to include as part of the transfer, a mitigation program that effectively corrects possible injury before it becomes critical. A mitigation program might include:

(1) curtailment of pumping until natural recharge corrects the issue, (2) lowering of pumping bowls in wells, (3) reimbursement for significant increases in pumping costs due to the additional groundwater pumping to support the transfer, and (4) other action as appropriate.

Groundwater pumping to support water transfers is very controversial in many Northern California counties. Groundwater substitution transfer proponents need to quickly and aggressively mitigate impacts caused by groundwater substitution transfers in the local area if these transfers are to be useful in the future. DWR is committed to promoting responsible groundwater substitution transfers that protect the water users and the environment in the water source areas.

VII. Protection of Water Rights

California law protects the underlying water rights of those parties who wish to transfer a portion of their surface water supply to others. Water Code Section 1011.5 specifically protects the surface water rights of water users who use groundwater in lieu of surface water rights. However, reporting requirements apply. Water Code Section 1745 *et seq*., also protects the underlying water rights from forfeiture for water transfers to the State's Dry Year Water Purchase Program and other programs. In addition, DWR's water purchase agreements expressly recognize the legal protections afforded the seller's underlying water rights. Additional information about water rights protection and water transfers is available in the "Guide to Water Transfers" published by SWRCB staff and available on SWRCB web site at www.waterrights.ca.gov.

03/08/02

Water Transfers Based on Crop Shifting and Crop Idling

How to Make Them Work in the Sacramento Valley in 2002

I. Introduction

The purpose of this and related papers is to provide guidance to local parties who wish to sell water to the State's 2002 Dry Year Water Purchase Program and the Environmental Water Account (EWA) [13] through water transfers[14]. The focus of these papers is water transfers from areas in the greater Sacramento Valley to areas south and west of the Sacramento-San Joaquin River Delta. These papers should not be considered to provide technical guidance for other water source areas. The information in this paper is intended to assist parties in developing the data and materials needed to support agreements for water transfer purchases and water conveyance with the Department of Water Resources (DWR).

This paper was prepared by the Water Transfers Office of DWR. Contributions to this paper were made by technical experts from within DWR and the U.S. Bureau of Reclamation (USBR) and interested parties in the Sacramento Valley. DWR appreciates the assistance of all the individuals who helped produce and review this paper. Those who helped may not agree with all aspects of this paper. However, most agreed that its development would be helpful as DWR begins water supply purchase discussions for the State's 2002 Dry Year Water Purchase Program and the Environmental Water Account (EWA).

For an overview of water transfers for 2002, parties are encouraged to read a companion paper, "Information to Parties Interested in Making

[13] The Environmental Water Account (EWA) is a State and federal program established in the August 2000, CALFED Record of Decision to allow additional environmental protection actions with no uncompensated water or power costs to the water users. The water supply costs of the program are made up in part through water transfers.

[14] These papers are presented to facilitate and expedite the contracting process with DWR for responsible water transfers and are not intended to have regulatory effect.

Water Available to the Environmental Water Account (EWA) or State's 2002 Dry Year Water Purchase Program." This paper is available by contacting the Water Transfer Office at (916) 651-7054.

DWR encourages water transfers as a way to help meet local water supply needs as well as those of the State and the environment. The purpose of this paper is to assist parties interested in conducting water transfers based on the shifting or idling of crops in the Sacramento Valley where the assistance of DWR or USBR is needed to either purchase this water or convey it to users outside the Sacramento Valley. It will be updated as experience is gained in the future.

Water transfer proposals that are not responsive to the contracting guidance presented in this paper will not be included by DWR in the 2002 Dry Year Water Purchase Program or the 2002 Environmental Water Account Program. Such proposals may be pursued independently. However, DWR and USBR reserve all rights to protest any such proposals that adversely affect the water rights they hold.

II. Overview of Crop Shifting/Crop Idling Water Transfers

A central objective of any water transfer program based on crop shifting or idling is to reduce the consumptive use of surface water applied for irrigation. While such a program is not required to document a one-for-one reduction in surface water diversions, each proposal needs to make a credible case that reductions in surface water diversions will occur consistent with the reductions in consumptive use of applied surface water.

California law protects other existing water users, the environment and (in many cases) the source area economy when water is transferred.[15] The effects of a water transfer involving crop shifting or

[15] California Water Code Section 1810 *et seq*., specifies the requirements that must be met in order for DWR and other regional and local agencies to allow use of their conveyance facilities. Also, Water Code Sections 386, 1702, 1706, 1727 and 1736 follow the common law and establish similar requirements for changes in water rights. Strictly speaking, economic issues are typically only required to be evaluated in water transfers that seek to utilize DWR's water conveyance facilities or those of other State or local agencies. However, economic impacts that are associated with physical changes to the environment may require analysis under the California Environmental Quality Act (CEQA).

idling are evaluated from the conditions that would exist absent the water transfer. These conditions are used as a baseline to determine the water supply benefits of the transfer.

Crop shifting and idling should be done in a manner that protects the local and regional economy. Decisions to modify cropping patterns are made by the local water user. Crop idling should be limited in the amount of land included in the program and done when necessary for water supply purposes. This paper provides technical guidance for crop shifting and crop idling programs performed in water years of below normal precipitation. Long-term arrangements for programs related to crop idling in above normal and wet years are beyond the scope of this paper and need additional evaluation. Limiting the number of years acceptable for such a program is intended to help protect the local farm economy and to avoid some environmental impacts.

III. Estimating Conditions That Would Occur Absent the Program

A key element of a crop shifting and crop idling program is to determine the conditions that would exist absent the program. Predicting such conditions accurately is often difficult. The use of historical cropping patterns is currently the best method to estimate conditions that would exist absent the crop shifting and crop idling program.

Accurate crop records for five years immediately preceding the transfer need to be provided to document crop history for either individual farms or large water districts that wish to participate in a crop shifting or crop idling program[16]. This crop history is needed to identify the type of crops typically grown in the area, degree of typical land fallowing that takes place, and typical crop rotation practices. In the event that five years of crop records are not available, reliable alternative methods for documenting crop history are needed. As discussed below, the requirement to provide five years of crop records is not intended to pre-determine the appropriate baseline for

[16] Crop acreage should be reported in net field acres of the actual farmed and irrigated acres. If only gross field acres are known (i.e., the county parcel acres), then multiply the gross acres by 0.95 to estimate net acres. Crop acreage needs to be included for each crop (include fallowed lands and non-irrigated crops) for the water district or individual farm operation.

determining the reduction in consumptive use associated with any specific transfer.

Individual farm operations and larger water districts present different opportunities and challenges for determining and reporting on conditions that would have existed absent the water transfer. Individual farm operations need to provide the crop history and maps for each land parcel participating in the program in a format acceptable to DWR and USBR. For large water districts, the crop history for the entire water district is needed, along with district acreage each year and district maps.

A. Large Water Districts[17]

For large water districts, crop rotation issues are typically not an issue due to the large area involved and the mix of different farming choices practiced within the district. However, crop choices vary year-to-year and it is difficult to predict with any accuracy future conditions absent a crop shifting and crop idling program. The best indicator of next year's crop patterns is some representation of the recent past. Large water districts interested in a crop shifting and crop idling program need to provide an accurate record of crops acreage, fallowed land, dry farmed and total acres within the entire district for the last five years. If only a few individual landowners within the water district wish to participate in the program, they should coordinate with their water district and refer to section B below on methods to calculate expected water savings. However, using water district totals is less data intensive and easier to develop if numerous landowners are involved.

The previous year's crop acreage of a water district is presumed to be the best indication of the next year's crop patterns provided the water supply has not been affected by droughts and the acreage of the one or two highest water using crops is

[17] The term water district is used in this paper as shorthand to include any water company, district, or other entity that provides water service to a group of landholders and can enter into a binding contract with DWR.

typical of past years. The average acreages for these high-water-using crops in each district needs to be reviewed. If acreage values for these high-water-using crops for the immediate prior year are within five percent of the five-year average for these crops, then the last years cropping patterns will be used as the base for calculating changes due to the crop shifting and idling program. If the highest water using crop acreages fall outside this range, then another more typical year or an average of cropping patterns and acreages will be used as mutually agreeable between DWR, USBR and the parties proposing the water transfer. The previous year's data may also be used if additional explanation is provided and DWR and USBR and the parties proposing the transfer agree that this is the best representation of conditions that would exist absent the crop shifting crop idling program. If agreement among DWR, USBR and the water district cannot be reached on an estimate of the conditions that would likely exist absent the crop shifting and idling program, then DWR will not participate in the proposed crop shifting or idling program that year with that particular water district.

Agreement between DWR and USBR on the method to determine the water made available from a crop shifting and crop idling program is essential. These two agencies are responsible, as a condition of their water right permits for meeting water quality and related flow standards in the Sacramento-San Joaquin Delta. This requires an equitable basis of splitting in-basin water demands between these two projects. This is done under the Coordinated Operations Agreement (COA) between these two agencies. If in-basin demand is reduced by a crop shifting and crop idling program, appropriate credit under the COA needs to be given to the entity that caused the reduction. When this is done, this credit can be tracked through the Delta. Any crediting under the COA for water transfers is done by mutual agreement of DWR and USBR. Without such agreement the water transfer cannot be properly credited and tracked through the Delta.

B. Individual Farm Operations and Small Water Districts

For individual farm operations or small water districts, crop rotation patterns can make the use of last year's cropping patterns an inappropriate measure of likely future conditions absent the crop shifting/idling program. The previous five years of crop history will help identify significant crop rotation cycles. In cases where crop rotation cycles are evident for the whole of the farm operation or small water district, the use of either (1) a repeating crop pattern or (2) the five-year average should be used. In these cases, specific fields to be enrolled in the program need to be identified and the five-year crop history for these fields provided.

Use of a repeating pattern to characterize routine land fallowing and crop rotation practices requires the proponent to provide an exact repeating pattern of crop/land fallowing practices for the fields to be enrolled in the program. A minimum five-year record is required to establish the pattern. The lands considered routinely fallowed would correspond to those in the subsequent year of the pattern.

Using the five-year average to characterize routine land fallowing practices requires the proponent to provide the most recent five-year record of crop/land fallowing practices of the fields to be enrolled in the program. From this crop history, the five-year average crop/fallowing evaporation of applied water (ETAW) values would be calculated as indicated below for each field. The five-year average ETAW values for each field would be used as the base for determining changes due to the proposed crop shifting and crop idling program in the year of the transfer.

In addition to the historic crop acreage, the individual farm operation or small water district that as a whole shows significant crop rotation patterns needs to provide the following information: (1) the basis of right to use surface water during the spring and summer in the year of the proposed water transfer, (2) maps showing landownership boundary, current fields irrigated, fields routinely fallowed or not irrigated and

fields to be idled as part of the proposed water transfer (maps at a scale of 1:24,000 are preferred), (3) aerial photographs from available sources like ttp://terraserver.homeadvisor.msn.com/default.asp, and http://www.waterplan.water.ca.gov/landwateruse/landuse/ludataindex.htm, and
(4) a statement that water saved on the fields enrolled in the crop shifting/idling program will not be used in other areas under the control of the farm operations participating in the program.

Due to staff limitations in 2002, the highest priority for contracting will be given to entities that have the technical aspects of their proposals in order to demonstrate that significant quantities of water will be made available for transfer. A 5,000 acre-feet water transfer agreement takes almost as much staff time to process as a 50 acre-feet agreement. Parties are encouraged to work with existing water districts and water agencies to develop joint water transfer proposals. Individual farm operations are encouraged to assemble their data so that it can be efficiently evaluated.

IV. Use of Evapotranspiration of Applied Water (ETAW)

A. What is ETAW?

The calculation of water made available for transfer is based upon the quantity of surface water conserved for each qualifying idled acre of cropland and the crop acreage calculated above. The quantity of surface water conserved varies according to changes in the evapotranspiration of applied surface water (ETAW) associated with changes in the crops grown or lands idled due to the implementation of the crop shifting and crop idling program.

The use of ETAW does not include possible surface water savings of extra irrigation water typically applied and lost as deep percolation to groundwater or possible reductions in ditch conveyance losses. The quantification of these possible savings

is difficult. In addition, some of the "losses" to groundwater may make their way back to the surface water system. Therefore, the use of ETAW is a conservative yet reasonable estimate of surface water savings due to crop shifting or idling until better information becomes available to quantify these losses.

ETAW values used to calculate water made available for transfer are developed by DWR. ETAW is defined as the portion of the total evapotranspiration that is provided by irrigation. The portion of the crop evapotranspiration met by precipitation occurring during the growing season or stored as soil moisture within the root zone before the growing season does not qualify as transferable water. Although the quantity of applied surface water required to support a given crop may vary from one year to the next as a result of changing weather conditions, ETAW values used for water transfer calculations are based upon crop water requirements reflecting average rainfall and evaporative demand.

DWR calculates normal year ETAW values using information and methodologies from established sources. To estimate crop evapotranspiration (ET), an evaporative demand index such as pan evaporation or reference evapotranspiration is adjusted by applying unique crop coefficients that have been calculated from studies over many years by the University of California Cooperative Extension, the U.S. Department of Agriculture, Agricultural Research Service, and DWR. Pan evaporation is measured using U.S. Weather Bureau Class A pans following standardized procedures and located in standardized environments.

In areas for which long-term pan evaporation data are unavailable, reference evapotranspiration is calculated using weather data collected by automated weather stations of the California Irrigation Management Information System (CIMIS). These calculations are subsequently adjusted to provide consistency with the long-term pan data and pan-based crop coefficients. Additional data utilized to estimate crop ETAW values include long-term precipitation records,

representative crop planting and harvest dates, rooting depths and soil water-holding capacity data from soil surveys of the USDA Natural Resources Conservation Service. These crop ETAW values, developed by DWR for updates of *Bulletin 160, The California Water Plan*, are periodically revised as additional information becomes available.

Crop ET is initially calculated based on the assumption that the crop is well watered and is consuming water close to its physiological potential. This initial ET value is adjusted to reflect prevailing cultural and irrigation practices used in production agriculture that in some cases reduce ET below the physiological potential. In addition, ETAW values may be reduced for areas where shallow groundwater contributes to crop ET.

B. ETAW Values and Limitations on Crops and Lands

The ETAW values for crops in the Sacramento Valley have been estimated by DWR and USBR for use in year 2002 water transfers. These values are shown in Table 1. The values will be refined in the future as additional information becomes available.

Experience has shown that some crops, lands and agricultural practices need to be avoided in developing a crop idling or crop shifting program. The specific reasons for avoiding them vary, but all relate to the difficulty in determining the real savings in water if they are included in the program. Table 2 lists several crops not suitable for shifting or idling as a means of making water available for transfer. Also, specific lands and practices need to be avoided in order to have a crop shifting or idling program acceptable to DWR and USBR. The lands and practices not acceptable in a crop shifting and idling program for 2002 are listed below:

- The idling of irrigated pasture or alfalfa crops that cannot be easily verified by metered use of applied surface water and drainage water.

- Removal of permanent crops.
- Fields irrigated by groundwater.
- Crop shifting on lands located where groundwater is within five feet of the land surface or where the crop root zone may extend into the groundwater table. In these areas, crop idling is the preferred practice and weed control may be needed if ambient weed roots are able to reach the groundwater table.
- Where increased water use on other lands within the transferring water district or within the control of the transferring party offsets the volume of water conserved through crop shifting or crop idling.

V. Estimating Water Available for Transfer

A. Large Water Districts

A large water district needs to evaluate the crop acreage that would have existed absent the transfer using the methods presented above. This includes the acreage for each crop, fallowed lands and other lands. The ETAW values from Table 1 need to be used to calculate ETAW for the district. Both DWR and USBR need to approve the method used to develop this base for further calculations. The water district then needs to evaluate the willingness of participating farmers to modify their operations to make water available for transfer. The crop acreages expected in the coming year are determined for each crop, fallowed lands and other lands. Using these acreages, the ETAW for the coming year is calculated by the same method used for the base year acreage. The base and expected current year crop acreages for the district are checked to make sure they match. The difference between the base and current year ETAW is used to estimate the water made available by the crop shifting and crop idling program.

B. Individual Farm Operations or Small Water Districts

As stated in "Section III B." individual farm operations and small water districts may exhibit significant crop rotation sequences and may wish to simply enroll specific land parcels into a crop shifting/crop idling program. In these cases, the crop history for each land parcel enrolled in the program needs to be evaluated separately. Either of two methods can be used to establish the baseline for estimating the amount of water made available due to the crop shifting/crop idling program for individual land parcels. These are the: (1) repeating pattern or (2) the five-year average as discussed in Section III B. The baseline ETAW for each parcel is established. The ETAW for the parcel for the current year is then established. The difference between the base and current year ETAW is used to estimate the water made available by the crop shifting/crop idling program.

VI. Limitations on the Water Made Available for Transfer

Water made available through crop shifting and crop idling for water transfer purposes occurs in the late spring and summer on a pattern that follows the ETAW of the crops involved. This water could be used directly by others with appropriate changes in the direct diversion water rights of the party transferring the water. This water can also be transferred through the Delta during times when capacity is available at the CVP or SWP pumping facilities. However, this capacity often fluctuates during the summer. There are often pumping capacity "windows" that open and close during the summer due to the needs of CVP or SWP for this capacity, fish concerns, water level issues in the Southern Delta, or other factors.

Water made available through a crop shifting and idling program can also have value to DWR or USBR for south-of-the Delta uses if it occurs during balanced conditions in the Delta or helps meet instream river flow requirements of DWR or USBR upstream of the Delta. In order to make this water useful in a water transfer south or west of the Delta for DWR or USBR, these daily water supply savings need to be stored or otherwise credited during the summer. Historically, this

crediting has occurred upon prior arrangement and agreement with DWR or USBR, as part of their water purchase programs. The use of this crediting mechanism in water purchases for crop shifting and crop idling effectively means that DWR and USBR are using their water rights to appropriate water foregone due to the water purchases. DWR and USBR must be convinced that these programs are appropriate for crediting in order for them to use their water rights in this fashion in their water purchase programs. Use of the procedures presented in this paper generally satisfies this concern.

Also, the value of the water saved through crop shifting and crop idling is diminished in wet years when balanced conditions during the summer are more limited. These types of transfers are best suited for water years of below normal precipitation.

VIII. Adjustments for Water Shortage Years

During very dry years, water districts that may wish to participate in a crop shifting/idling program may be facing water shortages. Under this situation only the additional acreage beyond that reduced by the water supply shortage will be included in the program. This acreage will be determined on a case-by-case basis assuming that the lowest value, highest water using crops are the ones reduced due to water supply shortages.

IX. Continuation of Normal Farm Practices

Any crop idling needs to be dispersed to minimize impacts on terrestrial wildlife and waterfowl species that may use irrigated croplands or irrigation/drainage ditches for temporary or permanent forage and habitat purposes. Normal farm operations for idled lands are expected to continue. Idled land cannot be irrigated to get the full credit of the expected water savings. Special actions on idled lands to remove weeds that utilize available soil moisture from rainfall are not required in the Sacramento Valley except in areas with very high water tables. The loss of rainfall-provided soil moisture due to weeds on the Sacramento Valley floor is not considered a significant water supply loss given the possible benefits to wildlife of not taking special

actions to remove these weeds. However, seepage from surface water sources to idled areas will be subtracted from the amount of water supply credit given to these areas.

X. Protection of Water Rights

California law protects the underlying water rights of those parties who wish to transfer a portion of their surface water supply to others. California Water Code Section 1745 *et seq*., protects the underlying water rights from forfeiture for water transfers to the State's Dry Year Water Purchase Program and other programs. In addition, DWR purchase agreements expressly recognize the legal protections afforded the seller's underlying water rights. Additional information about water rights protection and water transfers is available in the "Guide to Water Transfers" published by SWRCB staff and available on SWRCB web site at www.waterrights.ca.gov.

XI. Reporting

Accurate reporting of the activities undertaken as part of a crop shifting and crop idling program is another essential provision of any water transfer program agreement. Reporting is the responsibility of the seller and needs to be acceptable to DWR.

XI. Verification

Verification of the activities taken to make water available through a crop shifting or crop idling program may be conducted by DWR. Sellers will need to allow access to fields by DWR staff for verification purposes. DWR will coordinate verification activities with USBR.

XII. Effects on the Economy of the Local Community

Crop shifting and crop idling programs have the potential to affect the local economy if they are taken to an extreme. Those parties that

depend on farming related activities can experience some decrease in business if land idling becomes extensive. Studies by RAND after the 1991 dry year in which over 800,000 acre-feet were transferred could not detect overall economic impacts due to the crop idling programs that year in part due to the significant economic conditions being experienced at the time. Over 150,000 acres were taken out of agricultural production that year to support water transfers. In 2001, rice acreage was reduced by about 35,000 acres in the Sacramento Valley as a direct result of crop shifting and crop idling programs. This was less that a 10 percent decrease in rice acreage from the previous year. The economic effect of this decrease on the overall economies of the individual counties in which it occurred was calculated by DWR staff to be much less than one-percent.

Water districts and others participating in crop shifting and crop idling programs need to be sensitive to the possible economic impacts of their actions on their business partners and their neighbors. Geographically distributing the acres that are idled can avoid or minimize possible economic effects. In addition, water districts and individuals that receive funds from the sale of water related to these programs are encouraged to continue their normal business practices of investing income back into their operation and as much as possible, within the local economy. These reinvestments may not benefit those possibly affected by the crop idling program but can help offset overall economic impacts in the county.

DWR will monitor the cumulative economic effects of crop shifting and crop idling programs in 2002 in the Sacramento Valley. DWR will either limit its participation in crop idling programs for water transfer or take specific actions to ensure that the overall economic effect in individual counties where such programs are implemented does not become unreasonable.

XIII. Hearing if Crop Idling Exceeds Certain Levels

Water Code Section 1745.05 (b) provides that if the amount of water made available by land fallowing (idling) exceeds 20 percent of the water that would have been applied absent the proposed water transfer, a public hearing by the water supply agency is required. This

code section applies to water transfers to the State's Dry Year Water Purchase Program. In the past, crop idling programs have stayed well below the 20 percent water delivery threshold for a hearing. Water supply agencies interested in participating in a crop shifting and crop idling program need to be aware of this water code section and conduct a public hearing if they propose a program where crop idling exceeds the 20 percent threshold.

Table 1

Estimated ETAW Values (in acre-feet /acre) for Various Crops[18] suitable for Shifting or Idling in 2002

Crop	ETAW (in af/acre)
Bean	1.5
Corn	1.8
Cotton	2.3
Melon	1.1
Milo	1.6
Onion	1.1
Pumpkin	1.1
Rice	3.3
Rye Grass (Winter Irrigation)	0
Safflower	.7
Sudan Grass	3.0
Sugar Beets	2.5
Sunflower	1.4
Tomato	1.8
Vine Seed/ Cucurbits	1.1
Wheat (over wintered)	.5
Wild Rice	2.0

[18] For use in 2002 in the Sacramento Valley only

Table 2

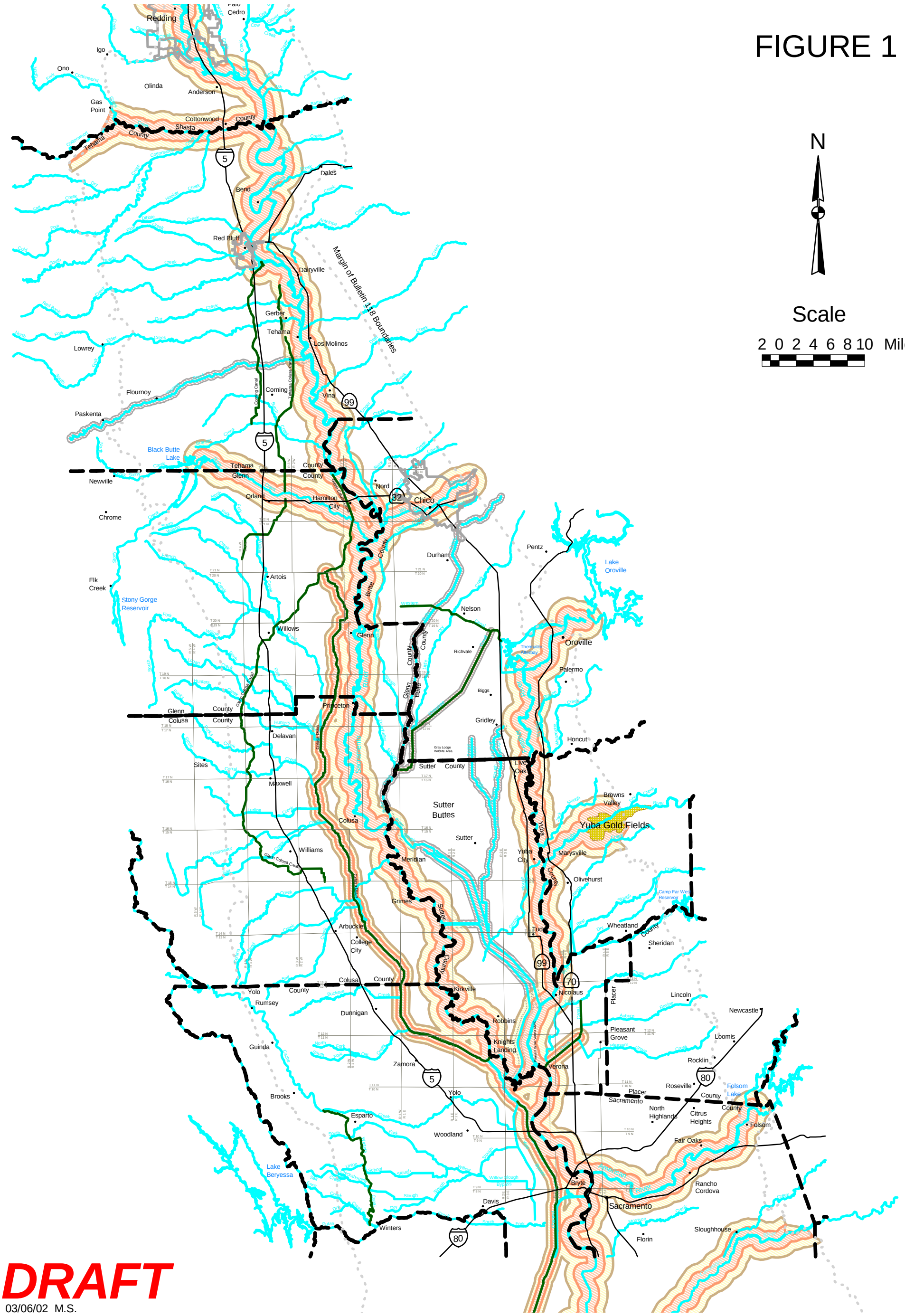
Estimated ETAW Values for Various Crops NOT suitable for Shifting or Idling in 2002

(See Section IV.B)

Crop	ETAW (in af/acre)
Alfalfa	3.0 [19]
Almonds	2.7
Pasture	3.3
Prunes (Deciduous Orchard)	2.5
Walnut	2.6

[19] The ETAW for Alfalfa can vary greatly depending on the amount of applied water

FIGURE 1



DRAFT

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N

Scale

2 0 2 4 6 8 10 Miles

Groundwater Substitution Water Transfers

Well Approval Areas

Legend

- Primary Approval Zone
- Secondary Approval Zone
- Status Pending

State of California
Department of Water Resources
Division of Planning and Local Assistance
Central District

Basemap provided by: MBK Engineers

This map revised and maintained for the Water Transfers Office